DOCUMENT RESUME

ED 221 525 SP 021 065

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TITLE Cognitive Attainment of Learners of Student Teachers Across Two Units of Study.
INSTITUTION Texas A and M Univ., College Station. Coll. of Education.
PUB DATE Sep 82
NOTE 18p.; Prepared in the Instructional Research Laboratory.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Educational Objectives; Higher Education; Preservice Teacher Education; *Student Teachers; *Teacher Effectiveness; Teacher Evaluation; Teacher Influence

ABSTRACT

Research was conducted among 82 secondary level student teachers to determine whether teacher candidate effectiveness is related to learners' cognitive attainment levels. The quantitative difference in the number of objectives achieved by over 6,000 learners in 2 units taught by student teachers was examined over 5 semesters. The student teachers were supervised by 5 university supervisors and 57 classroom supervisors from 12 schools. Two rating scales were used by the university supervisors to rate the student teachers: an evaluation profile of instructional skills and a checklist for curriculum context. Student teachers completed two self-evaluation instruments and developed criterion-referenced tests to provide learner achievement data from their pupils. The findings indicated that there were no sizable differences in the percentage of objectives achieved across the two units taught by the student teachers. Tables are provided giving the percent of total objectives achieved by learners, the number of instructional periods used by student teachers for the two units, and the time devoted to teaching each unit. (JD)

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ED221525

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September, 1982

SP 021065

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Cognitive Attainment of Learners of Student Teachers Across Two Units of Study

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This research study initiates work in the area of teacher education based on designing programs that will employ the diagnostic-prescriptive model of teaching. The research project resulted in a substantial data file containing multiple measures of learner attainment information. Descriptive statistics in this paper are used to answer the question: Is there a quantitative difference in the numbers of objectives achieved by the learners across two units taught by student teachers?

Professional literature on teacher education is replete with references to teacher performance adjudged successful if it is evaluated as effective and efficient. Types and formats of instruments used are as varied as the studies. Reviews of the research repeatedly yield descriptions of teacher behaviors leaving one with the belief that teacher behaviors are causal as far as learning is concerned, yet this has not been adequately proved. What is not yet listed in education indexes about teacher effectiveness is the variable of learner attainment either because researchers have not chosen to study the end result of learning, or they have not published their studies on the topic. Probably, it is a combination of the two.

Educators have been equating learner attainment with effective teaching but the proof is not in print. Teacher effectiveness is easier to research and perhaps to understand for as long as teacher education programs have been established there have been guidelines, if not admonishments, about what ought to be in teaching. As early as

1839, included in a list of principles of teaching were some of these:

1. Ever be self-possessed--be deliberate that you may not have to annul anything which you say or do. Nothing tends more to destroy authority than frequent changes in rules.
2. Give no commands unless you intend that they shall be obeyed. Follow them up and see that they are obeyed. The disregard of one leads to neglect of others.

10. Take care not to speak often of small things.
11. Put confidence in your scholars. (Evaluating Student Teaching, 1960)

The student teacher has had ample advice since the inception of the normal schools. Always the attention has been drawn to teacher behaviors even if the directions to the teacher candidate were to note that the main purpose of teaching is to facilitate learning. Adams and Dickey (1956) emphasized to the student teacher that the "one important criterion for evaluating teaching is the efficiency of the learning that has taken place. Thus, the objectives, methods, and techniques of teaching must converge toward learning as the goal to be achieved." The goals, objectives, and experiences of the teacher to be evaluated, and the kind of behavior to be appraised require a variety of methods and techniques for summarizing and interpreting evidence which is obtained as part of the evaluation program. Tests of intelligence and subject matter achievement no longer meet the needs for appraisal in student teaching.

In the recent past, the closest the literature has come to offering suggestions for the use of learner criteria for evaluating teaching effectiveness appeared in a discourse entitled Working With Student Teachers. Guidelines were given that directly referred to the learners and were called "Educational Principles."

1. Each learner is unique.
2. Each learner both develops and reacts as a whole.
3. Readiness for learning is conditioned by background, motivation, maturity.
4. The individual learns in terms of his purpose.
5. Maximum transfer occurs when learning takes place in situations similar to those in which it is (or will be) used, and when pupils are helped to generalize from their experience.
6. That which is not used tends to be forgotten.

(Stratemeyer and Lindsey, 1958)

Teacher education programs all have instruments for measuring efficiency. Criteria outlined invariably concentrates on teacher behaviors. One will have difficulty finding an instrument that includes learner attainment levels as a criteria for measuring teacher effectiveness. Typically, evaluation instruments have categories such as "Teaching Competence" which has ratings for Grasp of Content, Skill in Planning, Use of Plans, Recognition of Individuals, Ability to Stimulate, Skill in Questioning; Discussion and Use of Instructional Materials (Evaluating Student Teachers, 1960). The Rhode Island College of Education describes teacher competence on its instrument in these terms: application of theory to practice; planning; use of materials; understanding and use of "growth and development"; skill in motivation and evaluation; provision for individual needs; questioning skill (Evaluating Student Teachers, 1960). The instrument provides a rating scale of inadequate to superior with instructions to the rater to add comments about strengths and weaknesses.

Contemporary analyses of teaching have been constrained within the so-called "process-product paradigm" (Sanders, 1978). The paradigm

has directed and delimited the study of teaching to the search for stable, empirical relationships between antecedent teacher behaviors and consequent student outcomes. This conception of teaching and teacher effectiveness is acknowledged to be the "heart of the performance-and competency-based approaches to teacher education, teacher evaluation and teacher accountability (which) has to be the empirically established relationship between teacher behavior as an independent variable and student cognitive and affective outcomes as dependent variables. (Berliner, 1976).

In spite of the arguments against use of the process-product paradigm, the commitment to the behavioristic model of teacher effectiveness and to performance-based teacher education requires asking a crucial question: Does the empirical research support the general hypothesis that teacher behavior is differentially related to student outcomes? (Sanders, 1978) Reviews of the research concludes there is no relationship between teacher behavior and student achievement (Health and Nielson, 1974).

Proponents of the paradigm argue that the frustration lies in methodological problems that have prevented confirmation of the general hypothesis. Therefore, what researchers need to do to establish relationships is to deal with problems of instrumentation, methodology, and statistics.

A research approach that amalgamates learner cognitive attainment with systematic classroom observations of student teachers can serve to provide data for answering the question of teacher behaviors affecting learner outcomes. Some of the specific questions that can be asked are:

Is the cognitive attainment of learners markedly different across different student teachers? Are student teachers equally effective in producing cognitive growth among their learners? Can the diagnostic-prescriptive model of instruction be empirically validated? Is there a quantitative difference in the instruction provided across units taught by student teachers? Research was conducted under the auspices of the teacher education program in Educational Curriculum and Instruction at Texas A & M University over five semesters (Spring 1978-Spring 1980) for the purpose of determining whether teacher candidate effectiveness could feasibly be related to the cognitive attainment levels of learners. Many questions have arisen as a result of the extensive data collection and there is room for more. Analysis of the existing data triggers query and is offered with that purpose in mind.

A specific question addressed in this paper is: Is there a quantitative difference in the number of objectives achieved by the learners across two units taught by the student teachers? This and other questions may provide impetus for resolving the methodological problems encountered in trying to establish relationships between teaching and learner attainment. At best, newer, more accurate instrumentation will be designed and offered to the educational community for general use. In the interim, fellow researchers can use the work already accomplished to build on the knowledge in existence about the teaching-learning process.

METHOD

Participants

Participants comprising the sample for the data base were eighty-two

secondary level student teachers and 9001 learners taught by the student teachers. Most of the student teachers were education majors (69%); most were females (80%). The student teachers were supervised by five Texas A & M University supervisors over the five semesters (Spring 1978-Spring 1980). Though the number of student teachers in this study numbered 82, the total number of secondary level student teachers in that period numbered 291. The participants represented approximately 28% of the student teachers enrolled in the teacher education program.

Learner participants were pupils assigned to the classes the student teachers were given to teach. School districts participating in the teacher education program are these six located in Central Texas:

Bryan	(A.D.A. = 8412)	Hearne	(A.D.A. = 1607)
Caldwell	(A.D.A. = 1263)	Navasota	(A.D.A. = 2005)
College Station	(A.D.A. = 3255)	Katy	(A.D.A. = 6432)

Fifty-seven classroom supervisors from 12 campuses served as supervising teachers. In this group, five worked with a student teacher for each of the three semesters the data were collected; fourteen others served as supervisors for two semesters.

Information stored in the data file groups the learners by student teacher, by building site or school district. Student teachers are listed by numbers. Because the data on some student teachers had to be purged, student teacher numbers which are 1-90 are inconsistent with the 82 as previously stated. Once a teacher was assigned a number it remained.

Procedure

Rating scales, estimate summaries and criterion-referenced tests

were used to gather the data for this study. Two rating scales were used by the university supervisors to rate the student teacher's performance: Evaluation Profile and Curriculum Context Checklist. The estimate summaries called for in the instrument, Summary Evaluation of Unit, was completed by the teaching candidate. The criterion-referenced tests were developed by the student teachers to provide learner attainment data.

The Evaluation Profile was used by the university supervisors to obtain instructional effectiveness ratings and was completed on a bi-weekly basis. The scale consists of twenty-eight Likert-type items categorically divided as instructional competencies (21 items) and personal and professional competencies (7 items). Each item on the scale is referenced to a performance objective in the student teaching program. The instructional skills addressed on the instrument are compatible with the skills and knowledges stressed in the diagnostic-prescriptive model of instruction (Armstrong, Denton, Savage 1978).

The Curriculum Context Checklist, the second rating scale, was used to rate the curricular units developed by the student teacher. Values from this scale provided data for the variable planning effectiveness. This particular instrument contains a five choice scale with individual items identifying the components of the curriculum unit, i.e., general goals, focusing generalizations, concept list, diagnostic component.

Student teachers completed two instruments which served self-evaluation functions and provided time ordered data for this data base. The Weekly Reflection Sheet asks for percentages of time spent

observing, planning, assisting, team teaching and/or assuming full responsibility. Additionally, the instrument contains a section for the student teacher to assess his/her morale by rating it on a scale of 1-5 and writing an explanation of the chosen rating. The Weekly Reflection Sheet was to be filled out at the end of each week's teaching and submitted to the university supervisor. The Summary Evaluation of Unit, the second instrument, was filled out immediately after completing the instruction associated with each unit. An estimate of the achievement level and socioeconomic level of the learners plus the actual number of class periods required to teach the unit were required data.

Of the data collected, the learner attainment is perhaps the most valuable. Student teachers had compiled achievement information from learner attainment of individual unit objectives (there were two units used for this study), pretest scores and unit posttest scores. Criterion-referenced tests developed by the student teacher were used to measure learner achievement. The criterion-referenced tests were created by each teacher with guidance from the classroom and university supervisors who also checked the tests to be sure they related directly to the outcomes established for the performance objectives in each of the two units. Prior learning, extenuating classroom situations, and the abilities of the learners were taken into account in establishing both the objectives and the criterion-referenced tests.

Descriptive Analysis

Performance data on the learners indicates that of the objectives presented in each of the two units taught, no student teachers had

students achieve 100% of the objectives, although one student teacher had students achieve 97% in Unit 1, and one student teacher students achieve 98% in Unit 2. Using a typical mastery level percentage of 80%, the data reveals that in Unit 1, 21 teachers had students who achieved 80% or more of the objectives. Identically, in Unit 2, 21 teachers had students achieve 80% or more of the objectives. Seeking further comparison yields little differences. In Unit 1, seventy-one teachers had students achieve 50% or more. In Unit 2, the student teachers number 69. In both units, 10% of the students achieved less than 50% of the objectives.

Because of missing data, the actual number of learners accounted for in these statistics is 7041 for Unit 1 and 6609 for Unit 2. The mean for Unit 1, objectives achieved, was 69.44, standard deviation was 28.32. The mean for Unit 2 was 66.25, standard deviation 30.41. These data are summarized in Table 1.

Instruction in terms of periods and time devoted to each of the two units is summarized in Tables 2 and 3. Table 2 outlines the number of instructional periods student teachers used to teach each unit while Table 3 breaks the number of periods into minutes devoted to instruction.

TABLE I

PERCENT OF TOTAL OBJECTIVES ACHIEVED BY LEARNERS

UNIT I			UNIT II		
% of Total Objectives Achieved	Number of Student Teachers	Percent	% of Total Objectives Achieved	Number of Student Teachers	Percent
0	2	2.5	28	1	1.3
30	1	1.2	31	1	1.3
33	1	1.2	40	1	1.3
39	2	2.5	41	1	1.3
41	1	1.2	42	1	1.3
44	1	1.2	45	1	1.3
45	1	1.2	46	1	1.3
47	1	1.2	47	1	1.3
50	2	2.5	48	1	1.3
51	1	1.2	49	1	1.3
52	2	2.5	51	1	1.3
53	2	2.5	52	1	1.3
55	2	2/5	53	1	1.3
57	1	1.2	54	2	2.5
58	1	1.2	56	1	1.3
59	1	1.2	57	3	3.8
60	1	1.2	58	3	3.8
61	2	2.5	59	2	2.5
62	1	1.2	60	1	1.3
63	3	3.7	61	2	2.5
65	3	3.7	62	3	3.8
67	1	1.2	63	3	3.8
68	3	3.7	65	1	1.3
69	2	2.5	66	4	5.1
70	2	2.5	68	3	3.8
71	3	3.7	69	4	5.1
72	3	3.7	70	2	2.5
73	2	2.5	71	1	1.3
74	2	2.5	72	2	2.5
75	2	2.5	75	3	3.8
76	2	2.5	76	2	2.5
77	3	3.7	77	1	1.3
78	1	1.2	78	2	2.5
79	2	2.5	80	2	2.5
80	2	2.5	81	2	2.5
82	3	3.7	82	2	2.5
83	1	1.2	83	2	2.5
84	1	1.2	84	1	1.3
85	3	3.7	85	1	1.3
87	3	3.7	87	2	2.5
89	2	2.5	88	4	5.1
90	1	1.2	91	1	1.3
92	1	1.2	92	1	1.3
93	1	1.2	93	1	1.3
94	1	1.2	94	1	1.3
95	1	1.2	98	1	1.3
97	1	1.2	Missing data	3	Missing data
Missing Data	1	Missing Data	TOTALS	82	100.0
TOTALS	82	100.0			

TABLE 2

NUMBER OF INSTRUCTIONAL PERIODS USED BY STUDENT TEACHERS FOR UNIT I AND UNIT II

UNIT I			UNIT II		
Number of Periods	Number of Student Teachers	Percent	Number of Periods	Number of Student Teachers	Percent
0	2	2.4	0	5	6.1
2	1	1.2	2	1	1.2
3	2	2.4	3	3	3.7
4	2	2.4	4	3	3.7
5	2	2.4	5	2	2.4
6	1	1.2	6	2	2.4
8	4	4.9	7	4	4.9
9	6	7.3	8	7	8.5
10	27	32.9	9	14	17.1
11	9	11.0	10	27	32.9
12	7	8.5	11	4	4.9
13	4	4.9	12	2	2.4
14	4	4.9	13	1	1.2
15	2	2.4	14	2	2.4
16	3	3.7	15	1	1.2
18	1	1.2	16	3	3.7
20	1	1.2	17	1	1.2
22	1	1.2	TOTALS	82	100.0
25	1	1.2			
32	1	1.2			
42	1	1.2			
TOTALS	83	100.0			

TABLE 3

TIME DEVOTED TO TEACHING UNIT I AND II

TIME: Number of periods multiplied by the number of minutes in a period

UNIT I			UNIT II		
Minutes of Instruction Provided to the Learner	Number of Student Teachers	Percent	Number of Instruction Provided to the Learner	Number of Student Teachers	Percent
0	2	2.4	0	5	6.1
100	1	1.2	165	3	3.7
165	1	1.2	200	1	1.2
198	1	1.2	220	1	1.2
200	1	1.2	225	1	1.2
220	1	1.2	240	1	1.2
250	1	1.2	275	1	1.2
275	1	1.2	300	1	1.2
300	1	1.2	315	1	1.2
400	1	1.2	330	1	1.2
440	2	2.4	350	1	1.2
450	3	3.7	360	1	1.2
480	1	1.2	385	2	2.4
495	4	4.9	440	3	3.7
500	7	8.5	450	5	6.1
540	1	1.2	480	2	2.4
550	13	15.9	495	5	6.1
600	8	9.8	500	9	11.0
605	3	3.7	540	5	6.1
650	1	1.2	550	12	14.6
660	9	11.0	600	6	7.3
700	1	1.2	605	3	3.7
715	2	2.4	660	2	2.4
720	2	2.4	700	1	1.2
770	3	3.7	715	1	1.2
780	1	1.2	825	1	1.2
800	2	2.4	840	1	1.2
825	1	1.2	935	1	1.2
900	2	2.4	960	3	3.7
990	1	1.2	1204	1	1.2
1210	1	1.2	MISSING	1	1.2
1250	1	1.2	TOTALS	82	100.0
1760	1	1.2			
2520	1	1.2			
TOTALS	82	100.0			

FINDINGS

The question posed, Is there a quantitative difference in the number of objectives achieved by learners across two units taught by the student teachers? can be answered by careful analysis of the data presented in the three tables. Table I provides the most significant data. Simple calculations provide three important points. First, twenty-one of the 82 teachers (approximately one-fourth) were able to show proof that their students achieved 80% or more of the objectives. In mastery learning circles these teachers would be lauded. Second, seventy-one teachers were able to claim 50% or more objectives for Unit I; sixty-nine teachers met that standard for Unit II. Basically, this expresses that 85% of the student teachers were able to show proof of learner attainment amounting to half of the objectives given. Third, ten teachers were not able to produce results beyond 50% attainment of the objectives.

Looking at the units for comparison of attainment, one can only say that there is little difference worth noting. In no instance are the percentages of objectives achieved sharply showed one unit compared to the other unit.

The number of instructional periods as outlined in Table 2, and the time given to the teaching-learning process, Table 3, delineate the distribution per unit. Units were to be approximately two weeks in length each, which meant upwards of twenty class periods were the average. Table 2 shows the cluster around 8-12 class periods as the

amount of time the majority of the teachers used per unit. Those teachers on either extreme had shorter units (2-3 periods) or very lengthy ones (42 periods). Since the study did not require an exact number of periods, these statistics are valid and explained by actual time the student teachers used to teach what he/she considered a unit of study. The time devoted to the teaching-learning situation approximates a class period of 50-60 minutes. Exact number of minutes per period was not detailed. Some schools may have had class periods of longer duration than others. For example, in Unit I, the one student teacher who used two class periods indicated that was 100 minutes of instruction. These periods, then, had to be fifty minutes long. Whereas, another teacher in Unit I used 32 periods amounting to 1760 minutes which computes to 55 minute sessions.

DISCUSSION

These findings indicate that there are no sizable differences in the percentage of objectives achieved across two units taught by student teachers. Perhaps because one unit followed the other there was an insufficient lapse of time to determine if differences would occur. Had several units separated the two used for analysis, the learners might have shown a gain in the percentage achieved in Unit II over Unit I. Future studies might consider the aspect of lapsed time which could have an effect on learner attainment. It would seem plausible to assume that units taught later in student teaching would show gains due to teacher experience and learner familiarity with the teaching style, expectations, and test design.

Time as measured in periods/minutes for teaching the units ranged from two periods to 42 with the majority of the student teachers using from 8 to 12 periods to teach their units. Again, there are insignificant differences to note in these statistics. Teachers did not tend to change the amount of time used to teach from one unit to another. Quantitatively, the mean number of periods in Unit I was 11 while Unit II was 9.5. Since teachers typically used two weeks per unit the data confirms it. Time in minutes for Unit I averaged out to sixty minute periods while Unit II averaged out to fifty-five minutes. The findings are consistent with allotted time suggested, though not mandatory, number of periods.

The literature, to date, on learner attainment and student teacher effectiveness is almost nil. The variables examined in the particular investigation do not quash the issue of a casual factor or factors, rather the statistics raise more questions such as lapsed time between units and the effect mastery learning would have on raising the objectives achieved to a higher percentage in a retest situation per unit. If retesting for mastery were the student teacher's instructional strategy, would there be a difference quantitatively in Unit II? Researchers are to be encouraged to use the thrust of this study to conduct studies of their own. The need is apparent. Teacher education programs can only benefit from more insight about the effect of student teacher behaviors in terms of competencies on learner attainment.

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